

Report as of FY2011 for 2011ME235B: "Release of Metals to Groundwater from Ultramafic Rocks on Deer Isle, Maine"

Publications

Project 2011ME235B has resulted in no reported publications as of FY2011.

Report Follows

Release of Metals to Groundwater from Ultramafic Rocks on Deer Isle, Maine
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This project addresses heavy metal release via serpentinite weathering. Serpentinites are ultramafic rocks enriched in Cr, Ni, Cd, Co, and Mn and depleted in nutrients K, P, and Ca. Serpentine soils host unique biota that differ significantly from biota on different lithologies in the same regions. Very little is known about the fate and transport of these metals once they are released from rocks via chemical weathering. Because these rocks are often geographically isolated, they have not been extensively studied. However, the release of heavy metals could pose a significant health risk to the families who drink groundwater in these areas.

The goal of this study is to understand at what rate serpentinites release heavy metals, and in particular Cr, to ground and surface waters. Specifically, we will answer:

- How quickly are heavy metals released from serpentinites via chemical weathering?
- Are heavy metals disproportionately partitioned into soils, groundwater, or surface waters during chemical weathering?
- Are these heavy metals transported via groundwater, and do levels of heavy metals exceed WHO recommended maximum contaminant levels?

Preliminary results suggest that Cr is depleted relative to the bedrock in soils. Chromium is found below the WHO recommended maximum contaminant level of 100 $\mu\text{g/L}$ in both soil water (2-15 $\mu\text{g/L}$) and nearby Torrey Pond (<2 $\mu\text{g/L}$). Future work will install a well on-site to determine Cr concentrations in groundwater.

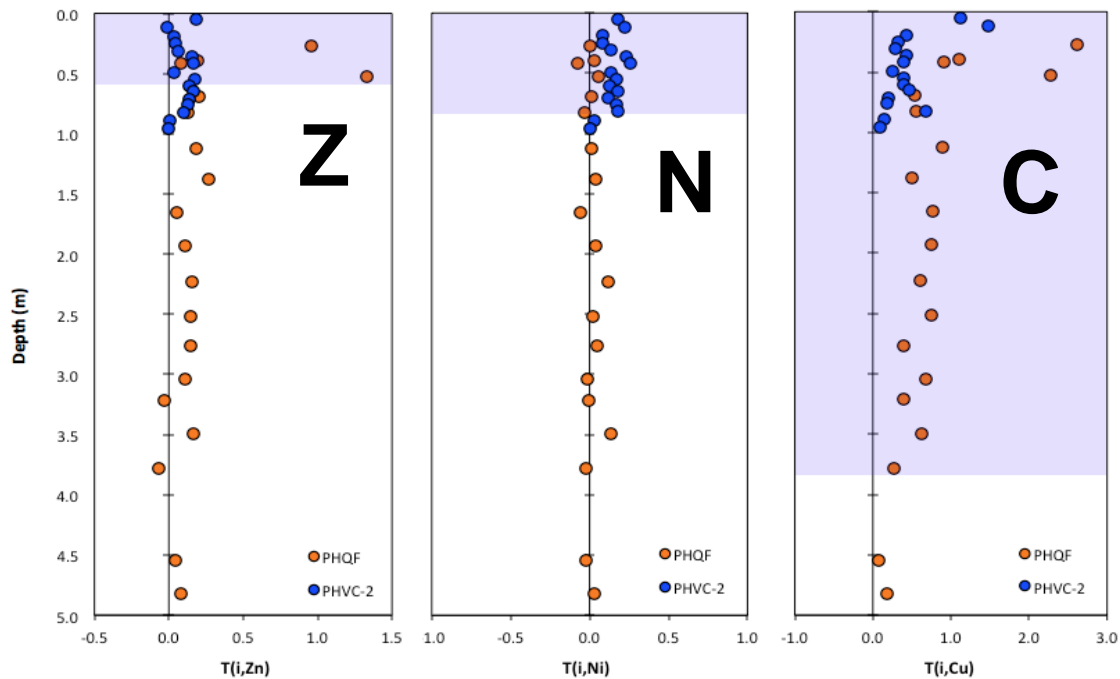


Figure 1. Enrichment in trace metals due to chemical weathering in the bedrock. Ca, K, and T show depletion relative to the parent rock, while Mg, Si, Fe, and Cr show no statistically significant change.

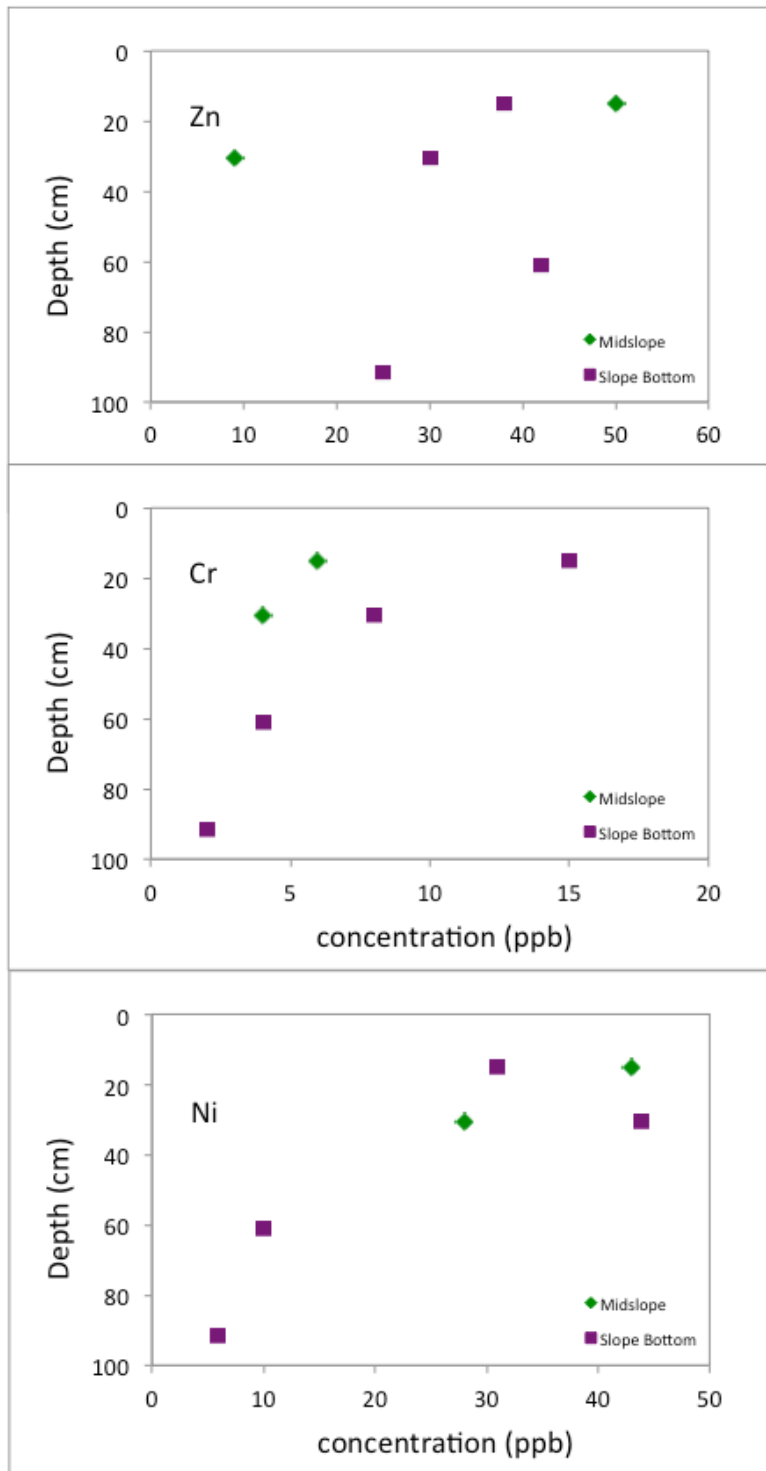


Figure 2. Heavy metal concentrations in soil waters from lysimeters placed at the mid-slope and slope bottom. Lysimeters placed at the hilltop were destroyed by vandals and will be replaced this summer.